# Blueprint for the Scientific Paper

## ABSTRACT

1. The abstract should provide a **brief** summary of each of the main sections of the paper.
   - Statement of the problem investigated and researched - historical development
   - Materials and methods
   - Data
   - Discussion and results

   It is a summation of the information contained in the document.
2. The abstract should not exceed 250 words. Some competitions or journals allow 75 words.
3. The abstract is written in **past tense**.
4. References to the literature must not be cited in the abstract.
5. There are different types of abstracts. They are: informative and indicative. Indicative is sometimes called descriptive.
6. Examine the words of the abstract carefully. If you can construct it in 100 words, do not use 200. Clear, significant work will impress the editors and reviewers.
7. Vocabulary of the abstract should include the descriptor words that will be used by a computerized database.

## KEY WORDS

1. Choose a maximum of seven key words used in the essay that will enable the reader to effectively understand your essay.

## INTRODUCTION

1. The introduction must be in the **present tense**.
2. The first part will identify the nature of the problem. It will define the problem very concisely and tell the reader about the topic.
3. The second part will briefly give a review of the literature. It will describe what has been done in the past that relates to your investigation.
4. In the next section the methods of investigation are described and you should give the rationale for choosing your investigation.
5. The writer should state the principal results and end with a sentence or two that really captivates the reader to continue reading the rest of the paper.
6. The introduction should not be any more than **one typewritten page**. It should contain words and structure that are very logical.

## BACKGROUND

1. The background includes the review of the related literature that relates to the original problem. how the investigation enhances the discipline being researched and its implications.
2. It should show where the investigation fits historically. Include what has been discovered previously, how the investigation enhances the discipline being researched and its implications.
3. The background should be approximately two pages in length and written in the **past tense**.

## MATERIALS AND PROCEDURES

1. In this section give the complete details in the **past tense**. The purpose of this section is to describe the experimental design and provide enough detail that a competent worker can repeat the experiment.
2. For materials, include the exact technical specifications, quantities, source or method of preparation. Avoid the use of trade names; use generic or chemical names. Animals are identified accurately, usually by genus, species, and strain designations. If human subjects are used, the criteria for selection should be described and an "informed consent" statement should be added to the manuscript if required by the journal.
3. This is the first section of the paper in which **subheadings** should be used. Construct subheadings that "match those to be used in the results".
4. The measurements and the analyses must be precise. Methods are similar to cookbook recipes. Statistical analyses are often necessary, but feature and discuss the data, not the statistics.
5. Materials and methods should be expressed in exact and specific items. Precise use of English is a **must**. Even a missing comma can cause havoc.
6. Use of labeled diagrams, flow charts, and step by step drawings, with directions, are very helpful.

## DATA

1. The data are presented in terms of the problem. It is codified, arranged and separated into segments that correspond to a particular part of the problem.
2. Graphic aids are "pictures" of technical writing: photographs, diagrams, charts, graphs and tables.
3. Graphics are usually appealing. They are easy to understand and remember, and they are an excellent way to show a relationship.
4. Effective graphics are appropriate to the writing situation, labeled completely, placed in an appropriate location and integrated with the text.
5. Tables and figures are numbered, and that number and label are referred to in the text exactly the same way.
6. Observations are quantified and are expressed in the form of numerical concepts.

## DISCUSSION OF THE RESULTS

1. Results should be designed to explain the meaning of the problem and strive to show a resolution.
2. Try to present the principles, relationships, and generalizations shown by the results--do not recapitulate the results.
3. Note the exceptions or any lack of correlation and define unsettled points.
4. Show how your results and interpretations agree.
5. Discuss the theoretical implications of your work, as well as any possible practical applications.
6. Summarize your evidence for each section or grouping.

## ANALYSIS AND SYNTHESIS

1. This section is the most difficult to write and is the most important. Most discussion sections are too verbose.
2. The section is the fitting climax of the paper. You do not need to reach cosmic conclusions, but you can spotlight on the one area of the truth. If you say something that is not supported by your data your analysis appears foolish.
3. The simplest statements evoke the most wisdom, verbose language and fancy technical words should be avoided.